

WHAT IS CLAIMED IS:

1. A method for promoting operator awareness during operation of a train comprising the steps of:

determining when a train is near a wayside signal device;

5 prompting an operator to enter a signal displayed on the wayside signal device;

accepting a signal from the operator;

taking corrective action if no signal is entered by the operator or if a signal entered by the operator is not a valid signal; and

allowing the train to proceed without taking corrective action if the train is
10 operated in compliance with the signal entered by the operator.

2. The method of Claim 1, wherein the corrective action includes activating a brake on the train.

3. The method of Claim 2, wherein the brakes are activated so as to stop the train.

15 4. The method of Claim 1, wherein the corrective action includes activating a warning device on the train.

5. The method of Claim 4, wherein the warning device is an audible warning device.

6. The method of Claim 1, further comprising the step of displaying the signal
20 on a display device.

7. The method of Claim 1, further comprising the step of calculating a timeout period by which the operator must enter a signal in response to the prompt, wherein the step of taking corrective action is performed if the operator fails to enter a valid signal within the timeout period.

8. The method of Claim 1, wherein the determining step is performed by obtaining location information corresponding to the wayside signal device from a database, obtaining position information corresponding to the train, and calculating a distance from the train to the wayside signal device using the position information and the location information.

9. The method of Claim 8, wherein the position information is obtained from a positioning system.

10. The method of Claim 9, wherein the positioning system is a global positioning system.

11. The method of Claim 1, further comprising the step of reconfiguring a device used by the operator to enter signal information in response to the prompting step.

12. The method of Claim 11, wherein the device comprises a plurality of buttons corresponding to possible signal aspects, and the reconfiguring step is performed by modifying a location of at least one button.

13. The method of Claim 12, wherein the location of the at least one button is modified by moving the at least one button to a location previously occupied by another button.

14. The method of Claim 1, further comprising the step of:
prompting an operator to repeat a first sequence;
displaying the first sequence to the operator;
receiving a sequence entered by the operator in response to the prompting step;
and

taking corrective action if the sequence received from the operator is different from the first sequence.

15. The method of Claim 14, further comprising the steps of:

modifying the first sequence to produce a second sequence different from the

5 first sequence; and

repeating the prompting step using the second sequence.

16. The method of Claim 15, wherein the modifying step is performed each time the prompting step is performed.

17. The method of Claim 14, wherein the prompting step is performed each
10 time the operator is prompted to enter a signal displayed on the wayside signal device.

18. A train control system comprising:

a controller located on a train;

an input device connected to the controller, the input device being configured
15 to accept a signal from an operator of the train and to provide the signal to the controller;

a track database connected to the controller, the track database including a location of at least one wayside signal device; and

a positioning system in communication with the controller, the positioning
20 system being located on the train and being configured to provide a position of the train to the controller;

wherein the controller is configured to perform the steps of:

determining when a train is near the at least one wayside signal device based on a position of the train received from the positioning system and a location of the device received from the track database;

5 prompting an operator to enter a signal displayed on the at least one wayside signal device;

 accepting a signal from the operator;

 taking corrective action if no signal is entered by the operator or if the signal entered by the operator is not a valid signal; and

10 allowing the train to proceed if possible to do so in compliance with the signal accepted from the operator without communicating with the wayside signal device to determine if the signal accepted from the operator matches the signal displayed on the at least one wayside signal device.

19. The system of Claim 18, further comprising:

15 a brake interface connected to the controller, the brake interface being configured to operate a brake on the train in response to a control signal from the controller;

 wherein the corrective action taken by the controller includes the step of stopping the train by operating the brakes via the brake interface.

20 20. The system of Claim 19, wherein the corrective action further includes the step of preventing the train from continuing until permission to continue is received from a dispatcher.

21. The system of Claim 18, further comprising:

 a warning device connected to the controller;

 wherein the corrective action includes activating the warning device.

22. The system of Claim 18, further comprising:
a first display device connected to the controller;
wherein the controller is further configured to display the wayside signal on
the first display device.

5 23. The system of Claim 18, wherein the positioning system is a global
positioning system.

24. The system of Claim 18, wherein the controller is further configured to
perform the step of calculating a timeout period by which the operator must enter a
signal in response to the prompt and wherein the step of taking corrective action is
10 performed if the operator fails to enter a valid signal within the timeout period.

25. The system of Claim 18, wherein the controller is further configured to
reconfigure the input device.

26. The system of Claim 25, wherein the input device comprises a plurality of
buttons corresponding to possible signal aspects, and the reconfiguring step is
15 performed by modifying a location of at least one button.

27. The system of Claim 26, wherein the location of the at least one button is
modified by moving the at least one button to a location previously occupied by
another button.

28. The system of Claim 18, wherein the controller is further configured to
20 perform the step of:

prompting an operator to repeat a first sequence;

displaying the first sequence to the operator;

receiving a sequence entered by the operator in response to the prompting step;

and

taking corrective action if the sequence received from the operator is different from the first sequence.

29. The system of Claim 28, wherein the controller is further configured to perform the steps of:

5 modifying the first sequence to produce a second sequence different from the first sequence; and

 repeating the prompting step using the second sequence.

30. The system of Claim 29, wherein the modifying step is performed each time the prompting step is performed.

10 31. The system of Claim 28, wherein the prompting step is performed each time the operator is prompted to enter a signal displayed on the wayside signal device.

32. A method for promoting train operator alertness comprising the steps of:

15 prompting an operator to enter a first signal corresponding to a wayside signal device;

 accepting the first signal on an input device from the operator, the input device including a plurality of buttons for entry of the signal; and

 rearranging the buttons.

33. The method of Claim 32, further comprising the steps of:

20 receiving a second signal from a wayside signaling device;

 comparing the first signal to the second signal; and

 taking corrective action if the first signal does not match the second signal.

34. A method for promoting train operator alertness comprising the steps of:
prompting an operator to repeat a sequence,
accepting a sequence from the operator,
comparing the sequence from the operator to the sequence of the prompting
5 step, and
taking corrective action if the sequence from the operator does not match the
sequence of the prompting step.
35. The method of Claim 34, wherein the prompting step is performed at
random intervals.
- 10 36. The method of Claim 34, wherein the prompting step is performed at
periodic intervals.
37. The method of Claim 34, wherein the prompting step is performed in
connection with entry of a first signal by the operator, the first signal corresponding
to a wayside signal device.
- 15 38. The method of Claim 37, further comprising the steps of:
receiving a second signal from the wayside signaling device;
comparing the first signal entered by the operator to the second signal; and
taking corrective action if the first signal does not match the second signal.
39. The method of Claim 37, further comprising the step of taking corrective
20 action if the first signal is not valid.
40. A train control system comprising:
a controller located on a train;
an input device connected to the controller, the input device being configured
to accept a signal from an operator of the train and to provide the signal to the

controller, the signal being entered by the operator using one of more of a plurality of buttons;

a track database connected to the controller, the track database including a plurality of locations, each of the locations corresponding to one of a plurality of wayside signal devices; and

a positioning system in communication with the controller, the positioning system being located on the train and being configured to provide a position of the train to the controller;

a receiver connected to the controller, the receiver being configured to receive a signals from the wayside signal device;

wherein the controller is configured to perform the steps of:

determining when a train is near a wayside signal device based on a position of the train received from the positioning system and a location of the device received from the track database;

prompting an operator to enter a signal displayed on the wayside signal device;

receiving a first signal from the operator via the input device;

receiving a second signal from the wayside signal device via the receiver;

taking corrective action if the first signal does not match the second signal or if the train is not operated in compliance with the second signal; and

rearranging the buttons after the first signal is received.

41. The train control system of Claim 40, further comprising a transmitter connected to the controller, wherein the controller is further configured to perform

the step of transmitting an interrogation message to the wayside signal device via the transmitter when the train is near the wayside signal device.

42. The train control system of Claim 40, wherein the corrective action includes activating a brake on the train.

5 43. The train control system of Claim 42, wherein the buttons are rearranged by moving the buttons.

44. The train control system of Claim 42, wherein the input device comprises a touch screen and the buttons are displayed on the touch screen.

45. A train control system comprising:
10 a controller located on a train;
 an input device connected to the controller, the input device being configured to accept a signal from an operator of the train and to provide the signal to the controller;

 a track database connected to the controller, the track database including a
15 plurality of locations, each of the locations corresponding to one of a plurality of wayside signal devices; and

 a positioning system in communication with the controller, the positioning system being located on the train and being configured to provide a position of the train to the controller;

20 a receiver connected to the controller, the receiver being configured to receive a signal from the wayside signal device;

 wherein the controller is configured to perform the steps of:

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determining when a train is near a wayside signal device based on a position of the train received from the positioning system and a location of the device received from the track database;

5 prompting an operator to repeat a sequence when the train is near the wayside signal device;

accepting a sequence from the operator via the input device;
taking corrective action if the sequence from the operator is incorrect;
prompting an operator to enter a signal displayed on the wayside signal device;

10 receiving a first signal from the operator via the input device;
receiving a second signal from the wayside signal device via the receiver; and

taking corrective action if the first signal does not match the second signal.